



IBM Software Group

Process Choreographer: High-level architecture

Birgit Duerrstein
WebSphere Process Choreographer Development
IBM Lab Boeblingen
duerrstein@de.ibm.com



business on demand.

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Agenda

- Business processes and SOA
- Process choreographer overview
- Types of business processes
- Runtime architecture
- Process life cycle



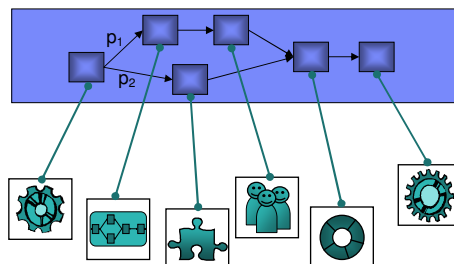
Service Oriented Architecture

- Every application or resource represented as a service with a standardized interface
- Applications arbitrarily distributed
- Applications exchange structured information (messages)
- Applications can be easily combined/choreographed to build business processes

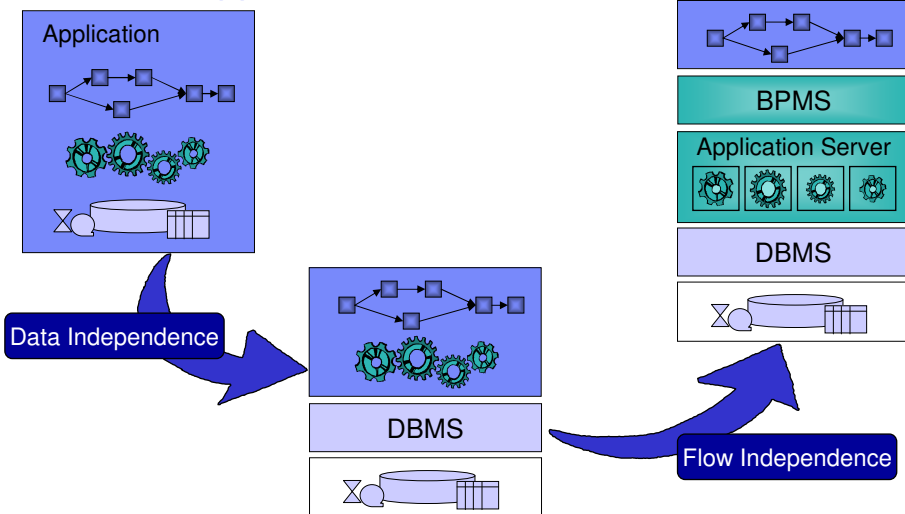


Business Process

- Introduces a layered programming model: Distinction between business logic/rules and business functions
- Flow determined by business rules



Flows and Application Architecture



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Process Choreographer – Facts

- “A set of functions that allow the composition, arrangement, execution, and administration of business processes”
- Provides choreography for
 - ▶ Web Services
 - ▶ Local J2EE Components (e.g. EJB)
 - ▶ Adapters
 - ▶ People based steps
- Integral Module of WebSphere Application Server
- J2EE based Process Engine
- Exploiting WAS Base features, e.g. Clustering, Security, Admin
- Customizable Web-based Client
- BPEL enablement (based on BPEL 1.1 and IBM BPEL extensions)



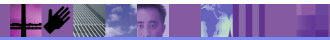
Process Choreographer – Products

- Tooling (WSADIE)
 - ▶ Graphical composition of BPEL processes
 - ▶ Unit test environment for business processes
 - ▶ Graphical debugging for business processes
- Runtime (WBISF)
 - ▶ Configuration and administration of the Business Process Engine
 - ▶ Installation and execution of applications based on Business Processes
 - ▶ Support for long running (interruptible) processes
 - ▶ Staff support for human interaction
 - ▶ Support for building compensation pairs



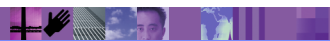
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Execution Model of a Process

- Two major types of Business Process Execution
 - Non-Interruptible processes are short-lived operations combined to form a single business operation
 - Example: Validate credit card information
 - Interruptible processes are long-running and are composed of business services
 - Example: Loan approval
 - Example: Document review

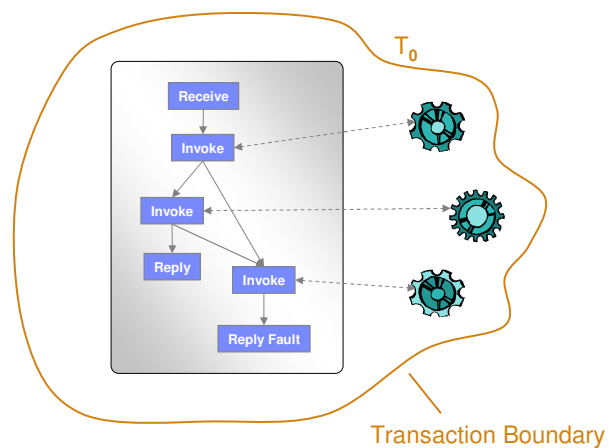


Non-Interruptible Business Processes

- „Microflow“
- Short running
- Non-interruptible
- Single unit of work (1 single transaction)
- No persistent state is maintained during execution
→ No database / message queueing system involved
- High throughput
- Synchronous execution
- Client can wait until business process completes



Transactions: Microflow

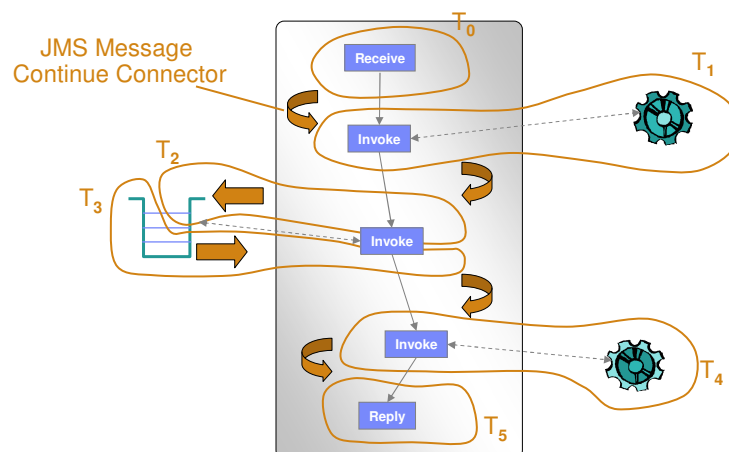


Interruptible Business Processes

- “Long running”
- Multiple Transactions
- Multiprocessing of different operations at the same time
- Execution can be paused
 - Wait for an outside event
- Completely forward recoverable
 - A Business Process which is suspended can continue execution from the suspended state
- Asynchronous execution
 - Client starts Business Process and continues execution
 - When Business Process completes, results can be passed to specific location
- State maintained during execution
 - State stored persistently in database
 - Usage of persistent messaging to reliably hold the navigation information of the flow

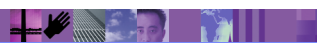


Transactions: Long-running process

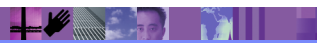
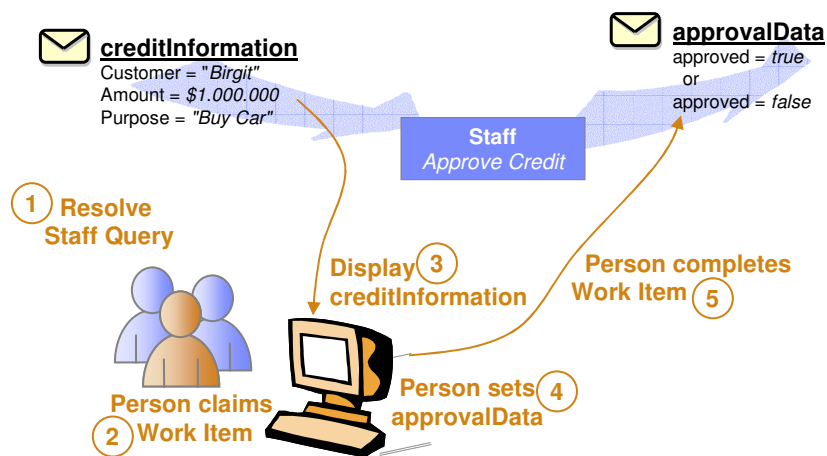


Human Interaction as part of the business process

- Only possible with long-running processes
- Represents step in the process that is performed by a person
- Work dynamically assigned to a specific individual or group of individuals
- Business process halts execution and waits for work to be completed
- When the work is completed, the business process will continue execution
- Administrators or supervisors are able to override, transfer, and manage tasks



Human Interaction

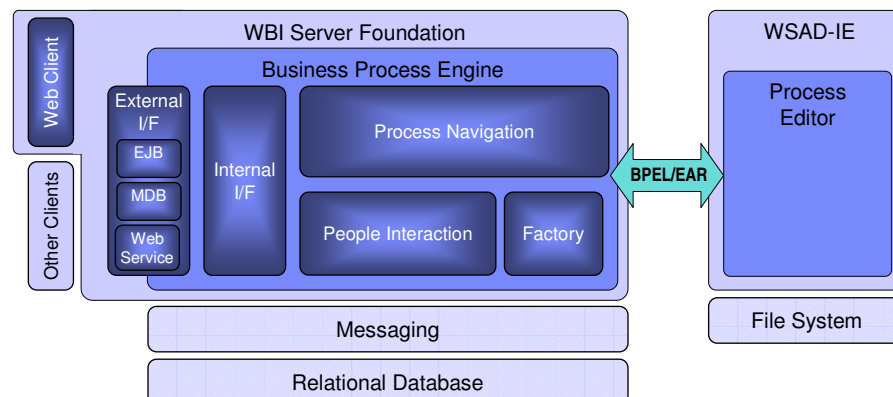


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Process Choreographer Runtime Architecture



Executing a Non-Interruptible Business Process

- Client request starts a Business Process instance through external API
- Client Transaction and Security context used
- Navigator executes all activities sequentially
 - Single thread, single transaction
 - Database (Factory) and JMS destinations not used
- Successful completion of the process commits the transaction



Executing an Interruptible Business Process

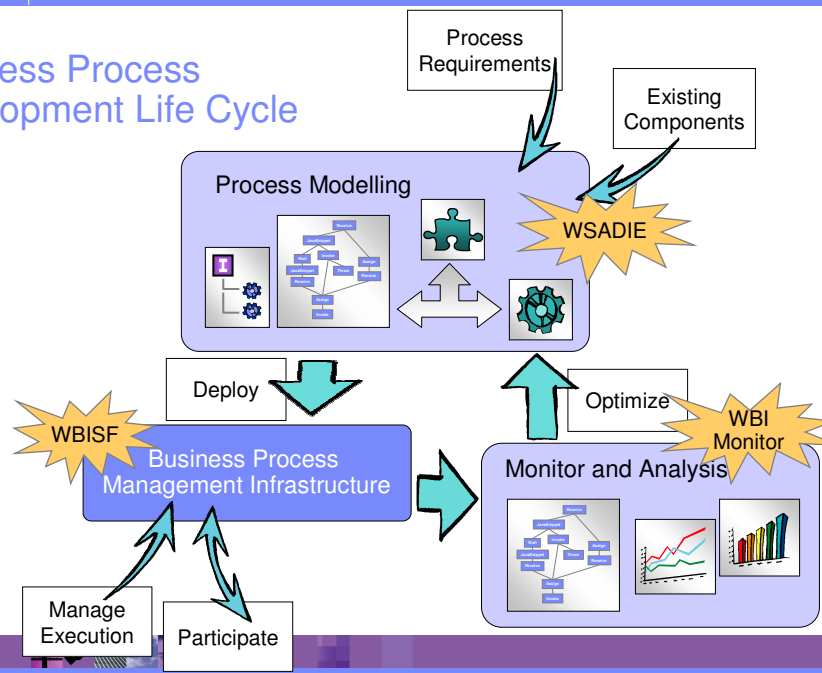
- Request starts a single Business Process instance through external API
- Navigator executes each activity under individual transaction
 1. Transaction begins
 2. Activity is read from internal JMS destination
 3. Instance restored from Database (Factory)
 4. Activity Invoked
 5. Response stored in Database (Factory)
 6. Next Activity message placed in internal JMS destination
 7. Transaction committed
- Security information stored in database when process starts and at end of each call and reused when next activity is executed
- Failed activity may be handled and Business Process “rollbacks” (compensation) can be performed



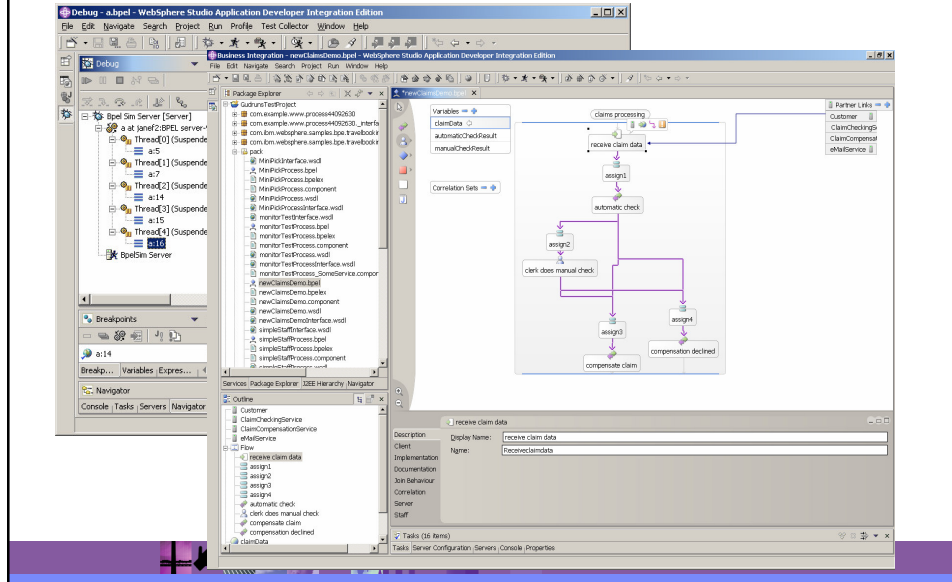
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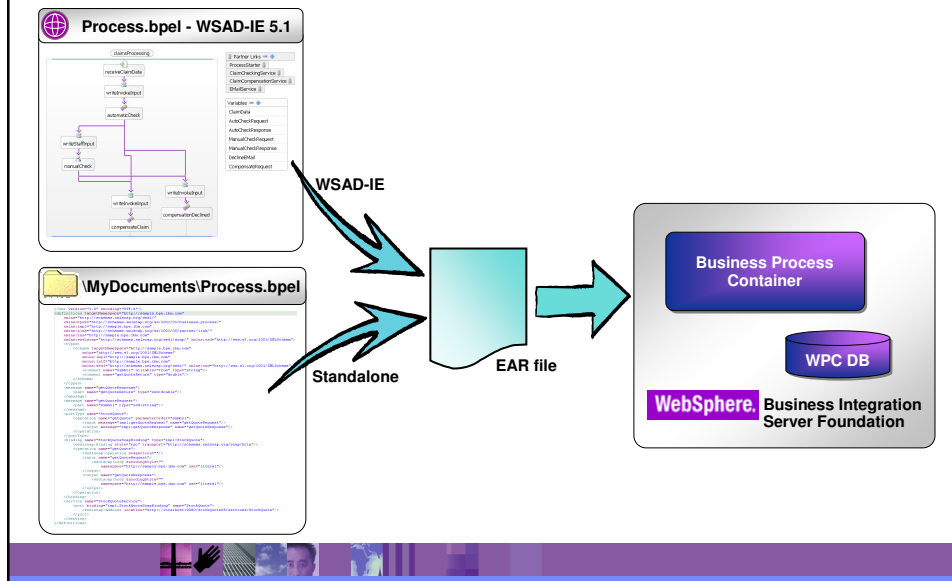
Business Process Development Life Cycle



Process Modeling – WSADIE



Process Deployment: WSAD-IE or Standalone



Process Deployment: Enterprise Application

- Process model
 - BPEL process
 - WSDL port types, partner link types, properties, property aliases
- Service endpoints
 - WSDL ports
- Deployment artifacts
 - Generated enterprise beans and classes
- Deployment descriptor and binding
 - Component definitions for processes and services
 - Component wiring
 - Generated EJB deployment descriptor and binding



Process Management Tasks

- Installation of Business Process applications
- Starting and Stopping Business Process Modules
- Uninstalling Business Process applications
 - Business processes are long running; must be stopped, and all instances must be completed (or terminated)
- Configuration of the Business Process Container
 - DB Backend, JMS, security roles, ...
- All tasks are integrated into WebSphere administration
 - Accessible from Administrative Console
 - Integrated with Network Deployment (ND) environment



Manage Process Templates

WebSphere Application Server Version 5 Administrative Console

Home | Save | Preferences | Logout | Help

User ID: brigt

Enterprise Applications > BPFL TravelBooking > EJB Modules > travelBookingProcessEJBJar > Business Processes > **travelBookingProcess**

This panel is used to start and stop business processes, where a business process is the definition of a workflow using BPEL. Generally, configuration changes take effect after you restart the server, but this panel updates both the configuration and the status of the business process on each running server without having to restart the servers. Each server and cluster which has this business process installed must be running.

Configuration

General Properties		
Name	travelBookingProcess	The name to use for the managed object which represents this live object. This managed object name acts as one component of a calculated hierarchical name that can be used with a ManagementAgent process to locate the live object's operational control interface at runtime.
Valid from Time	2003 January 01, 00:00:00	Specifies the point in time from which a process can be started.
Status	Started	Displays the current status. You can use the dropdown box to change the status. When you change the value, the status is changed in the configuration and on each running server.

Apply OK Reset Cancel

WebSphere Status December 29, 2003 1:39:33 PM CET

WebSphere Runtime Messages

Total All Messages: 1080 436 new, 436 total 294 new, 294 total 350 new, 350 total

Clear All

Done

Administer the Business Process Container

WebSphere Application Server Version 5 Administrative Console

Home | Save | Preferences | Logout | Help

User ID: root

pfau

Application Servers

Applications

Resources

Security

Environment

System Administration

Troubleshooting

Message(s)

The Business Process container is currently installed, and the values may not be changed.

Application Servers > server1 > Business Process Container

The Business Process container provides services to execute business processes within an application server. Use this panel to install the Business Process container or to view its values if it is already installed.

Configuration

Install

General Properties		
Datasource	jdbc/BPEDB	The JNDI name of the data source, which contains business process related data.
Security Role Mapping	BPESystemAdministrator	The user or group from the domain's user registry that is associated with the Business Process Administrator role.
Listener Port For Internal Messages	BPEInternalListenerPort	This listener port provides the settings for the MDB that handles messages exchanged within the Business Process container.

WebSphere Status February 28, 2003 10:35:46 AM CET

WebSphere Configuration Problems

Total Workspace Files 0 Total Configuration Problems 32

Preferences

Process Choreographer Web client

- Part of WBI Server Foundation
- Provides graphical user interface for process participants and administrators
- Based on external Process Choreographer API
 - Uses publicly available functions only
- Extensible
- Also integrated into process debugger
 - Start process to be debugged
 - Interact with staff activities of debugged process



Manage and Administer

WebSphere Business Integration Server Foundation

Process choreographer

IBM

UserID: Birgit [logoff](#)

Help

[My To Do](#)

[Define Work Item List](#)

Process Instance Lists

[Created By Me](#)

[Administered By Me](#)

[Undo Actions in Error](#)

[Define Process Instance List](#)

Process Template Lists

[My Templates](#)

[Define Template List](#)

Administration

[Manage Work Items for Process Instances](#)

[Manage Activities for Process Instances](#)

Process Instance Monitor

Use this page to view the status of the activities in a process instance. [\[i\]](#)

Process Description

Process Instance Name	first process	State	Running
Template Name	claimsProcess	Started	05/10/04 04:13:13 PM
Description	This process processes an insurance claim.		
Starter	Birgit		
Readers			
Administrators	Birgit		

Activities

To Do Name	State	Activity Kind	Activated
receiveClaimData	Finished	Receive	05/10/04 05:13:14 PM
automaticCheck	Finished	Invoke	05/10/04 05:13:16 PM
manualCheck	Skipped	Staff	-
compensateClaim	Running	Invoke	05/10/04 05:14:01 PM
compensationDeclined	Skipped	Invoke	-

Interacting with Process Instances

- Process Choreographer Web Client
 - Start and administer process instances
 - Handling of work items / staff activities

The screenshot displays the IBM Process Choreographer Web Client interface. The top navigation bar includes 'WebSphere Application Server' and 'Process and Work Items'. The left sidebar contains navigation links for 'Work Item Lists', 'Process Instance Lists', 'Process Template Lists', and 'Administration'. The main content area is titled 'My To Dos' and features a table of process instances.

<input type="checkbox"/>	To Do Name	State	Owner	Reason	Activated	Process	Template Name
<input type="checkbox"/>	BookInformation	Claimed	Bryt	Owner	5/15/03 10:07 AM	book1	buyBook
<input type="checkbox"/>	EndProcInfoData	Claimed	Bee	Owner	5/15/03 5:35 PM	J18000005.2c75891dca33276.21	invoice
<input type="checkbox"/>	EndProcInfoData	Ready		Potential Owner	5/20/03 11:37 AM	book1	buyBook
<input type="checkbox"/>	BookInformation	Ready		Potential Owner	5/20/03 11:37 AM	testPU	buyBook
<input type="checkbox"/>	EndProcInfoData	Claimed	Tom	Owner	5/20/03 11:48 AM	J18000005.44776036.c036776.4	OrderShuff
<input type="checkbox"/>	Staff	Ready		Potential Owner	5/20/03 1:49 PM	J18000005.4986424.c036776.88	staffProcess
<input type="checkbox"/>	Staff	Ready		Editor	5/20/03 1:49 PM	J18000005.4986424.c036776.88	staffProcess
<input type="checkbox"/>	Staff	Ready		Reader	5/20/03 1:49 PM	J18000005.4986424.c036776.88	staffProcess
<input type="checkbox"/>	Staff	Ready		Potential Owner	5/21/03 11:32 AM	s5	staffProcess
<input type="checkbox"/>	Staff	Ready		Editor	5/21/03 11:32 AM	s5	staffProcess
<input type="checkbox"/>	Staff	Ready		Reader	5/21/03 11:32 AM	s5	staffProcess